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Diversity of Roadside Tree Species in Urban Areas in Southern Zone of Ekiti State, Nigeria

J. Kayode[1] --- E. Franklin[2] --- M. J. Ayeni[3]

[1,2,3]*Department of Plant Science, Ekiti State University, Ado-Ekiti, Nigeria*

(*Corresponding Author*)

ABSTRACT

An enumeration of roadside trees along major routes of three selected urban towns in southern parts of Ekiti State was examined. A total of 23 tree species belonging to 16 families were enumerated. Tree density enumerated was 147 while houses in the tree vicinities were 442 thus given a ratio of 1 tree to 3 houses. Most of the trees were products of wildling preservation rather than planted. The products derivable from the trees constituted a major prerequisite to their being preserved and/or planted. The incentives and disincentives to tree domestication in the study area were identified. Strategies that would improve the present situation were proposed.

Keywords: Diversity, Roadside tree species, Urban areas.

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1. INTRODUCTION

The continued neglect of tree planting in rural and urban areas of Nigeria has continued to attract the attention of relevant stakeholders particularly now that emphases are being placed on the roles of the trees in meeting the subsistence needs of the populace. Previous studies by Kayode and Kadeba [6]; Kayode [7]; Ayeni and Kayode [1] as well as Kayode [8] enumerated several reasons why tree planting efforts had failed in Nigeria. Recent initiative is now considering tree domestication in residential areas as a benign strategy to encourage people's participation in tree planting. The trees were asserted to be indispensable in the provision of physical ecosystem services, most especially to the urban ecosystem [3].

Consequent on the above, it is being thought that an inventory and assessment of biodiversity in different habitats might be necessary for the evolvement of long term strategies for conserving the endangered tree species.

The study being reported here aimed at assessing the diversity of roadside tree species in urban areas of Southern Ekiti State. This is a major component of an ongoing effort at the Department of Plant Science of the

Ekiti State University, Ado-Ekiti, Nigeria, towards the evolvement of sustainable strategies that would enhance tree domestication in the state.

2. MATERIALS AND METHODS

Kayode [8] had provided the basic description of the location and climate of Ekiti State, Nigeria. The present study was conducted in the southern zone of Ekiti State which is made up of six local government areas. Three urban towns were selected from the zone and used in this study. They are, Ikere-Ekiti (8^{o}10'N, 3^{o}40'E), Ise-Ekiti (7^{o} 28'N, 5^{o} 26'E) and Emure-Ekiti (7^{O}27'N, 5^{O}28'E), located in Ekiti Southwest, Ikere and Emure local Government areas respectively. The study was restricted to the aboriginal areas of each town.

In each town, three major routes were selected from the *Oba's* palace (that is the palace of the traditional ruler), always situated in the center of the town in Yoruba land of Nigeria. The selected routes were as follows:

Ikere - Ekiti (A)

Route A_1 : Oba's palace Junction -- Akure Road

Route A_2 : Oba's palace Junction -- Ado Road

Route A_3 : Oba's palace Junction --College Road

Ise - Ekiti (B)

Route B_1 : Oba's palace Junction -- Olele Road

Route B_2 : Oba's palace Junction -- Erinwa Road

Route B_3 : Oba's palace Junction -- Olorunsogo Road

Emure - Ekiti (C)

Route C_1 : Oba's palace Junction -- Idamudu Road

Route C_2 : Oba's palace Junction -- Oda Road

Route C_3 : Oba's palace Junction -- Ariyasi Road.

In each of this route, a 500m distance was measured out. Inventories of trees and houses situated within 10m radius, of the center of the road, were carried out at every 50m distance, thus constituting 10 sampling points in each route.

Also in each route, 10 respondents, made up of residents along the route, were interviewed individually. The interviews were conducted with a fairly open frame work that allowed for focused, conversational and two-way communication [9]. A total of 30 respondents were interviewed in each town. Group interviews were also conducted among the respondents to determine group consensus on the subject matter. Similarly 10 key informants were identified and interviewed. These were made up of officials of the Forestry Division (2), Local Government (2) and Teachers (6).

The data obtained were subjected to descriptive statistics, mainly percentages, frequencies and inferential statistics, mostly chi-square. Similarity measures on the tree occurrences in the roadsides in the three urban towns were determined as follows:

1. Index of similarity (IS), after Kayode [5] as:

$$IS = 2C \times 100/ (A+B)$$

2. Jaccard index (S_j), after Gurevitch *et al.* [4] as:

$$S_j = C/ (A+B+C)$$

3. Sorensen Dice Index (SS_D), after Gurevitch *et al.* [4] as:

$$SS_D = 2C / (A+B+C)$$

4. Ochioi Index (S_O), after Gurevitch *et al.* [4] as:

$$S_O = C/ \sqrt{(A +C)} + \sqrt{(B +C)}$$

5. Asymmetrical similarity (S_{AS}), after Gurevitch *et al.* [4] as

$$SAS = B/ (B+2C)$$

Where A is the number of species in first town only

B is the number of species in second town only

C is the number of species common to both towns.

Also, the indices of diversity were calculated after Bongers *et al.* [2] as:

(i) Shannon-wiener Index (H) as:

$$H = - \sum p_i \, {}^2LOG \, p_i$$

Where $p_i = n_i / N$

n_i = Number of individual of species i and ,

N = total number of individuals

(ii) Simpson index (C)

$$C = \sum p_i^2$$

(iii) Equitability index (E)

$$E= H/H_m$$

Where $H_m = {}^2LOG \, S$

S = number of species

3. RESULTS AND DISCUSSION

Table 1 shows the demography of roadside trees and houses enumerated in the study area. While a total of 147 trees were enumerated, 442 houses were enumerated. Thus a ratio of 1:3 trees to houses was obtained. This tends to suggests that a tree serve three houses in the study area. Ayeni and Kayode [1] had earlier observed such low tree density in Ado-Ekiti, the capital city of Ekiti State. Field observation revealed that low density of tree was obtained in urban town A (Ikere - Ekiti), when compared to other towns. This could be attributed to the fact that the routes sampled constituted the major roads in the downtown with most of the houses constructed many years before the study, little or no regards was paid to the maintenance of prescribed set-back expected in the construction industry hence the expansion carried out on the roads some years back had eliminated most of the trees that were likely to have been preserved along these routes.

Most of the trees that were observed along the routes sampled were preserved (63%) rather than planted (Table 1). Field observation revealed that most of the trees were old and that the products derivable from them constituted a major prerequisite to their retention. Thus, out of the 23 species identified in this study (Table 2), the rank order of the frequency of occurrences revealed that 9 species were most frequent (Table 3). Products derived from these species ranged from shade/wind breaker, food/fruits, medicine, fodder, aesthetic/fencing, fuel/wood, construction, culture/spiritual (Table 4). Study by Kayode [8] asserted that the products derived

from tree have constituted major determinant on the type of trees to be adopted for domestication in Ekiti State, Nigeria.

Table 5 revealed that there were similarities in the occurrences of species in urban towns B and C (Ise-Ekiti and Emure-Ekiti) than A and B (Ikere-Ekiti and Emure-Ekiti) . Statistical analysis (X^2, 0.05%) on the occurrences of the trees revealed that there were no significant differences in the enumeration points in the towns sampled. Similarly the indices of diversity (Table 6) revealed low diversity in the tress sampled.

Table 7 shows the socio-economic classification of the respondents in the study area. Most of the respondents were females (59.9%), adults of age range of 20 - 60 years (71%), literates (75%) and mostly Christians and Muslims. Field observation revealed that all the respondents were tree mindedness thus suggesting that sex, age, education and religion status were not prerequisites to tree mindedness in the study area thus corroborating the previous observation of Kayode [8].

The respondents' perceptions of the roles of the roadside trees are shown in Table 8. Their abilities to control wind erosion and provision of shade were considered as major roles of the trees. Field observation revealed that strong wind usually accompanied the early sets of rains at the onset of raining season in the study area. The disincentives to planting roadside trees in the study area were enumerated in Table 9. These ranged from browsing by animals while in the juvenile stage, lack of incorporating trees planting in building plans, human disturbances through harvesting of leaves, barks and roots, land tenure, attacks of trees by termites and the ability of some trees in harboring snakes and in serving as habitats for birds .

In conclusion, the study revealed that a gross dearth of roadside trees abounds in urban towns of the study area, most especially at the downtowns. There is a strong need to enlighten the populace on the need to plant trees in the urban area, the local government authority should plant trees in major roads of urban and rural towns, the state government should set up an Urban Environment Development Board that should also be mandated to plant trees by roadsides. The aesthetic provided by the trees, the quality of air and the low temperature offered by the trees might likely improve the security of the streets, as more pedestrians would walk the street and more artisans, especially the resource-poor, might likely meet their demands for work environment from these trees.

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Table-1. Demography of Trees and Houses Enumerated in the Southern zone of Ekiti State, Nigeria

Description	**Communities**				
	A	B	C	Total	Average total
Density of Trees species	13	140	94	247	82
% of the trees planted	31%	36%	45%		37%
% of the trees preserved from Wildlings	69%	64%	55%		63%
No. of species	2	13	18		
Total Number of Species in A, B & C				23	
No. Of Houses	168	136	147	442	
Trees : Houses Ratio	1:12	1:1	1:2	1:3	

Source: Field Study, 2015

Table-2. Checklist of tree species in the roadside of urban area in the southern zone of Ekiti State, Nigeria

S/N	**Species**	**Vernacular name**	**Family**
1	*Alstonia boonie* De Willd	Ahun	Apocynaceae
2	*Anacardium occidentalis* L.	Kaju	Anacardiacea
3	*Annona muricata* L.	Sawasawa	Annonaceae
4	*Azachrachta indica* A.Juss.	Dongoyaro	Meliaceae
5	*Bambusa vulgaris* Schradiex et J.CWendl	Oparun	Poaceae
6	*Carica papaya* L.	Ibepe	Caricaceae
7	*Citrus limon (L.)Burn .F.*	*Osan-Wewe*	*Ruta*ceae
8	*Citrus sinensis (*L.)Osbeck	Osan	Rutaceae
9	*Cocos nucifera* L.	Agbon	Arecaceae
10	*Croton zambesicus* Mull.Arg	Ajekobale	Euphorbiaceae
11	*Delonix regia* (Hook.)Raf.	Sekeseke	Caesalpiniaceae
12	*Dialum guineense* Willd.	Uyan	Caesalpiniaceae
13	*Elaeis guineensis* Jacq.	Ope	Arecaceae

14	*Ficus thionningii* Blume	Odan	Moraceae
15	*Gliricidia sepium* (Jacq) et Walp	Agunmaniye	Papillnaceae
16	*Gmelina arborea* Roxb.	Melaina	Verbenaceae
17	*Mangefera indica* L.	Mangoro	Anacardiaceae
18	*Musa parasidiaca* L.	Ogede-Agbagba	Musaceae
19	*Musa sapientum* L.	Ogede-Wewe	Musaceae
20	*Neubouldia laevis* Saem. Ex.Bureau	Akoko	Bignoniacea
21	*Senna siannea* (Lam)Irwin& Barneby	Kassia	Caesalpiniceae
22	*Spondia mombin* L.	Iyeye	Anacardiaceae
23	*Terminalia superba* Engl.Diels	Furutu	Combretaceae

Source: Field Study, 2015

Table-3. Rank order of the frequently occurring roadside trees in the southern zone of Ekiti State,Nige

Rank	Species
1.	*F. thonningii*
2.	*S. siamea*
3.	*C. nucifera*
4.	*A. occidentalis*
5.	*A. indica*
6.	*G. sepium*
7.	*C. limon*
8.	*M. paradisiaca*
9.	*D. regia*

Source: Field Study, 2015

Table-4. Derivable products obtained by respondents from the roadside tress in the southern zone of Ekiti State, Nigeria

Product	Tree Species
Medicine	*A. boonie , A. indica , A. occidentalis , M.indica*
Shade/Wind Break	*C. limon , C.sinensis , C.nucifera , C.zamesicus ,*
Food/Fruits	*D. regia , D. guneensis ,*
Aesthetic/Fencing	*D. regia , G. sepium , S. siamea*
Fodders	*G. sapium*
Culture/Spiritual	*C. zambesicus , N. laevis*
Construction	*B. vulgaris*
Fuel	*B. vulgaris , G. sapium*

Source: Field Study, 2015

Table-5. Similarity indices on the occurrence of roadside tree species in the southern zone of Ekiti State, Nigeria

Communities	IS%	S_J	S_{SD}	S_O	S_{AS}
A - B	27	0.12	0.21	0.76	0.90
A - C	20	0.09	0.17	0.82	0.50
B - C	52	0.21	0.34	0.53	0.50

Source: Field Study, 2015

Table-6. Diversity indices of roadside tree species in the southern zone of Ekiti State, Nigeria

Community	Indices		
	H'	C	E
A	0.16	0.50	0.60
B	0.11	0.16	0.05
C	0.13	0.39	0.05

Source: Field Study, 2015

Table-7. Socio-economic classification of respondents in the southern zone of Ekiti State, Nigeria

Feature	Description	Proportion (%) of Respondents			Average total
		A	B	C	
Sex	Male	48	36	38	41
	Female	52	64	62	59
Age	<20yr	12	10	20	14
	20-60yr	52	86	74	71
	>60yr	6	4	6	5
Education	Literate	86	75	65	75
Status	Illiterate	14	25	35	25
Religion	Christian	74	64	60	66
Status	Islam	22	36	40	33
	Others	4	0	0	1

Source: Field Study, 2015

Table-8. Respondents' perception of the role of roadside tree species in the southern zone of Ekiti State, Nigeria

Roadside	Role
1.	Prevent wind erosion
2.	Provide shade
3.	Prevent water run off
4.	Provide cool breeze
5.	Sources of some important products (Non -wood forest products)
6.	Sources of fodder
7.	Sources of fuel.

Table-9. Disincentives to planting roadside trees in the southern zone of Ekiti State, Nigeria

Rank	Disincentives
1.	Browsing by animals at juvenile state
2.	Unplanned land us: Not incorporating trees in building plans
3.	Human exploitation / disturbance: Harvesting of leaves barks and roots
4.	Land Tenure / Ownership
5.	Termites attacks
6.	Harboring of snakes
7.	Habitats of birds